

THE POPULATION-LEVEL ESTIMATE OF THE EFFECT OF PRENATAL EXPOSURE TO TRAFFIC ON PRETERM BIRTH

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Background and Aims: Preterm birth is an important marker of health both in the neonatal period, through childhood and possibly into adulthood. In the U.S., 12-13% of births are preterm (Goldenberg 2008) – a public health problem that costs society at least \$26 billion a year (Behrman 2007). Associations between prenatal exposure to traffic and a variety of adverse birth outcomes including preterm birth have been reported (Shah 2011), but a causal relationship has not been established (HEI 2010). The aim of this study is to use causal inference estimators to evaluate the marginal (population level) effect of traffic density on preterm birth in a cohort of over 300,000 births in four counties in the Central Valley of California during years 2000-2006.

Methods: Preterm birth was defined as less than 37 weeks gestation as reported on the birth certificate. Traffic density was based on distance-decayed annual average daily traffic volumes. Targeted maximum likelihood estimation (TMLE) was applied to estimate the counterfactual probability of preterm birth had everyone been exposed to each quartile of traffic density. In addition, a population intervention model (PIM) was applied to estimate the potential change in preterm birth given a hypothetical intervention in which traffic density in the population was fixed at each quartile.

Results: The estimated probability of preterm birth is 11.9% had everyone been exposed to the highest quartile of traffic density, compared to 10.8% had everyone been exposed to the lowest quartile of traffic density. The PIM showed that if a hypothetical intervention could reduce the entire population's exposure to that of the lowest quartile, the population would have a reduction in preterm birth of 0.45% compared to what is observed.

Conclusion: Semi-parametric causal inference methods applied to these data support findings from previous studies that prenatal exposure to traffic adversely affects birth outcomes.

References:

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